

111-12,
STEEL-PLATE

CONSTRUCTION

CHIMNEYS

STAND PIPES

FLUE CONNECTIONS

Connery & Company, Ltd.

1326 North Ninth Street

Philadelphia, Pa.

CHIMNEY 2

Mr Carl Hering
* Sep. 1 - 1911 *



E S T A B L I S H E D 1 8 7 9

Originators of the Plate-by-Plate Method of Erection

STEEL - PLATE
CONSTRUCTION

CHIMNEYS

S T A N D - P I P E S

FLUE CONNECTIONS

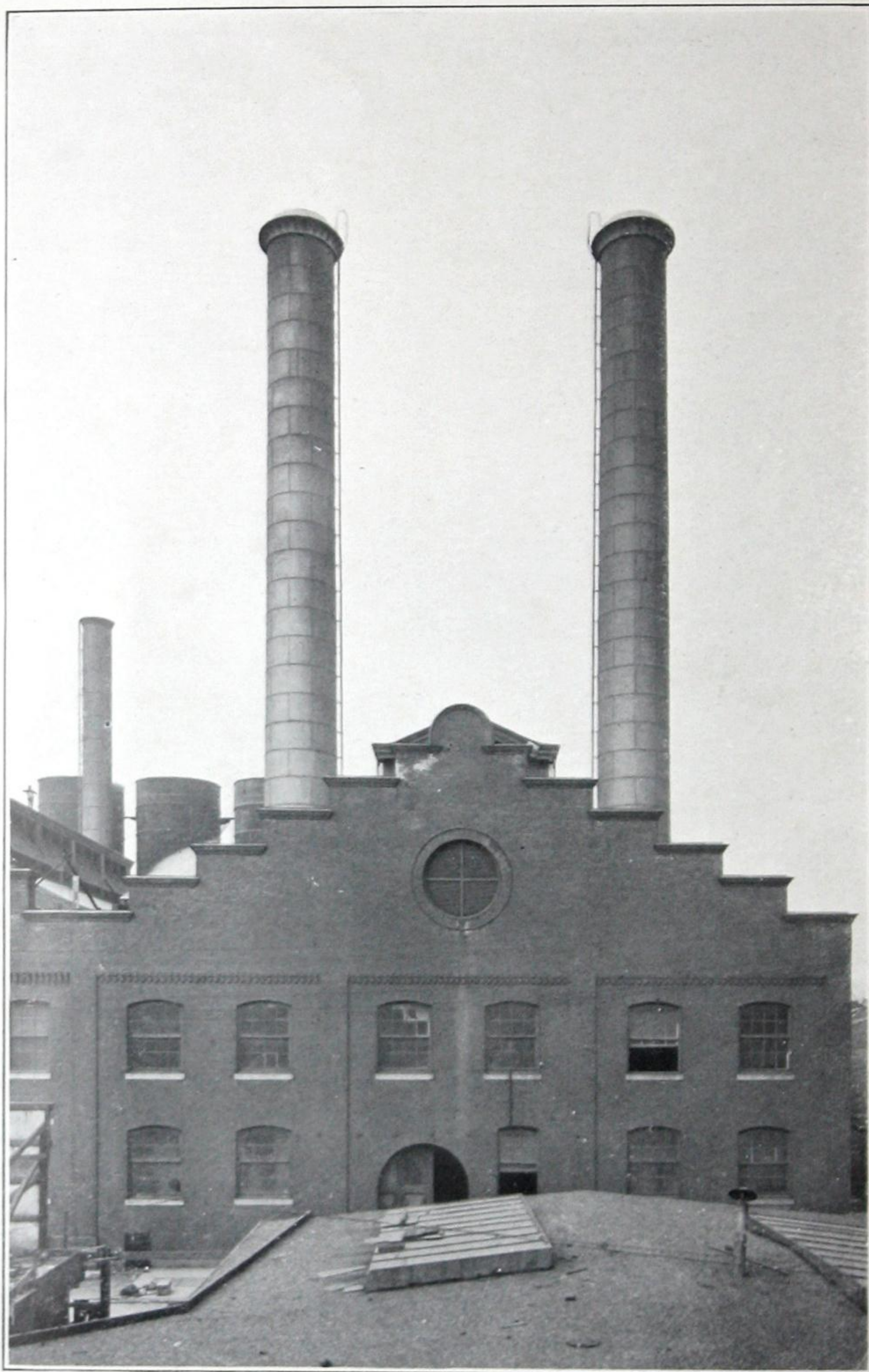
MATERIAL FOR ALL
SIZES KEPT IN STOCK

Connery & Company, Ltd.

1326 North Ninth Street

Philadelphia, Pa.





SELF SUPPORTING STEEL STACKS 15 Feet Diameter, 170 Feet High
Made and Erected in 1897 for
PHILADELPHIA RAPID TRANSIT CO., 13th and Mt. Vernon Streets
PHILADELPHIA, PA.

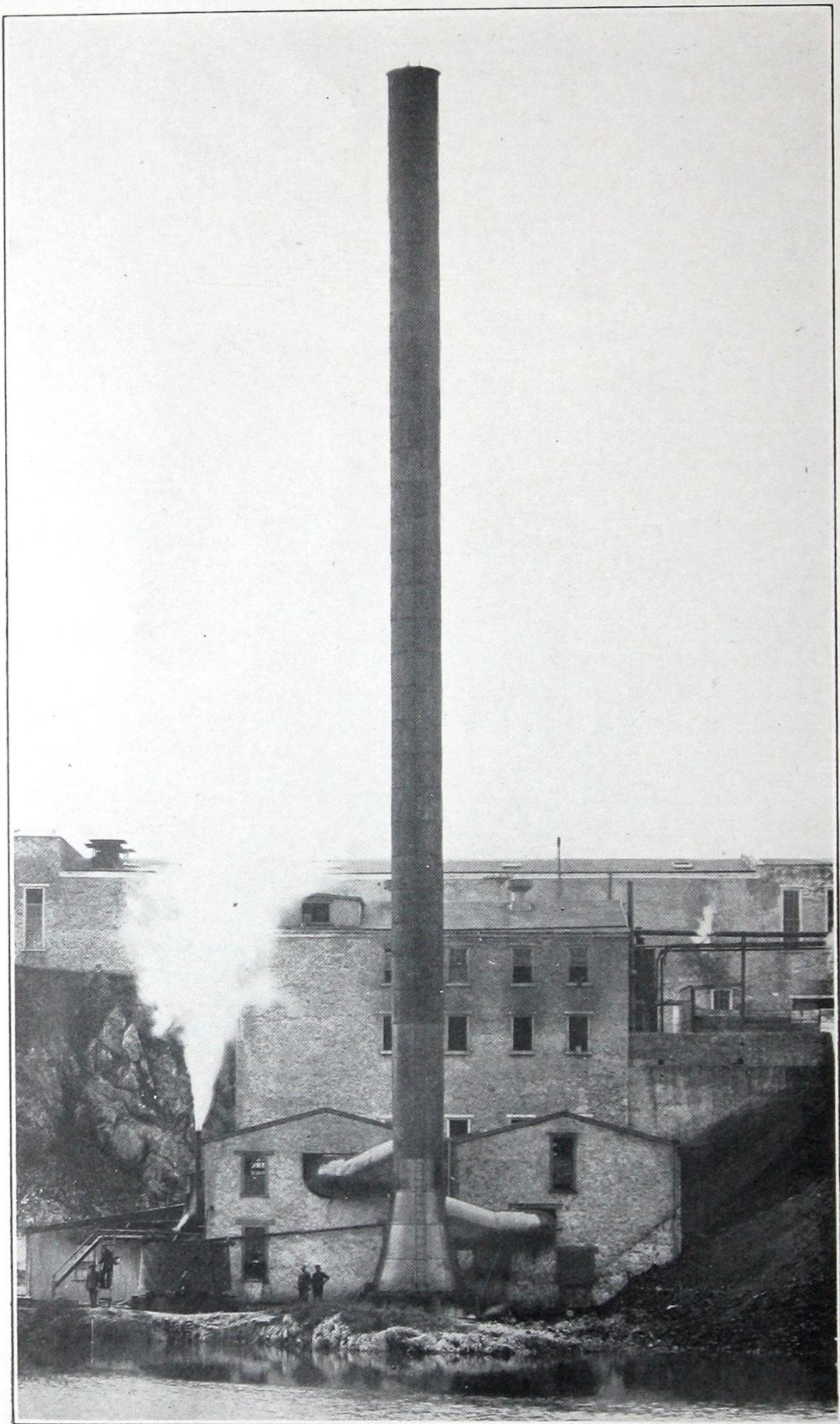
STEEL-PLATE CHIMNEYS

FOR ALL CLASSES OF SERVICE AND
FOR ALL LOCATIONS

DURING the past thirty years we have developed, along with our own experience, the building of steel-plate chimneys and all steel-plate constructions in connection therewith, and during all that time we have never known any of them to fail in any particular whatever; and, contrary to what would naturally be supposed, constant painting has not been required in chimneys lined with brickwork. The chimneys shown on opposite page have not been repainted since they were built in 1897. Chimneys that are not lined require more frequent painting, depending on the quality of paint used. Many may think that steel-plate chimneys are mere flimsy affairs requiring unsightly guys, and are only to be thought of in connection with a cheap plant, but we might state that the largest chimneys to be found anywhere have been constructed of steel plates. It is surprising that a brick chimney constructed of so many pieces of burnt clay, laid together in mortar, that has no tenacity, should be preferred by thinking engineers to a casing of steel having a tensile strength of 60,000 pounds per sq. in. securely riveted together and then solidly bolted through to the bottom of the foundation; and so stable, that if pulled upon from the top, it would upset from the very bottom of the foundation before it would noticeably bend through the length of the long shaft. The ordinary brick stack has to be considered as having a possible falling point at every joint and should be calculated in its successive steps of thicker to thinner walls to determine the point of least stability. For ordinary boiler purposes the unlined steel shell has proven very satisfactory. In many places—notably, along river fronts, on marshy ground, or where foundations are liable to settle—steel chimneys are preferable to brick chimneys. Their efficiency is somewhat higher because there is no infiltration of air as there is through brickwork. Some are lined with brick throughout their entire height and are bolted down to the base so as to require no stays, though in this case they would be sufficiently stable to stand by their own weight.

**A full Stock of Material for Chimneys of
all Sizes and Styles always on hand.**

Work Erected in all Parts of the United States



SELF SUPPORTING STEEL CHIMNEY—9 Feet Diameter, 150 Feet High
Taken Down at the Patterson Blast Furnace
Re-erected for
EHRET MAGNESIA CO., PORT KENNEDY, PA.

CHIMNEY DRAUGHT

THE designing of a chimney of proper size, height and general construction to give the boilers the requisite draught for their best performance, is one of the first problems confronting the engineer designing a steam plant. The theoretical formulæ deduced by Peclet, Rankine, and later by Prof. Gale and others, are of much interest to the scientist, but the engineer in designing a chimney still clings to empirical formulæ deduced from current successful practice.

WHAT IS A CHIMNEY FOR ?

The work of a chimney consists in promoting a flow of air through a furnace. The hot air in a chimney is lighter than the surrounding atmosphere, which therefore endeavors to force its way into the chimney from below in order to restore the balance of pressure. The only way into the chimney is through the grate bars, fuel and furnace, and in passing through these the air maintains the combustion and at the same time, becoming itself highly heated, makes the action of the chimney continuous.

The intensity of the draught varies about as the square root of the height, and the required intensity of draught depends upon the character of fuel to be used and the rate of combustion desired, being least for wood and greatest for the fine low grades of fuel.

While the intensity is a function of the height, the height must be governed not only by the desired intensity, but by the existing conditions, care being taken to be above surrounding hills and buildings.

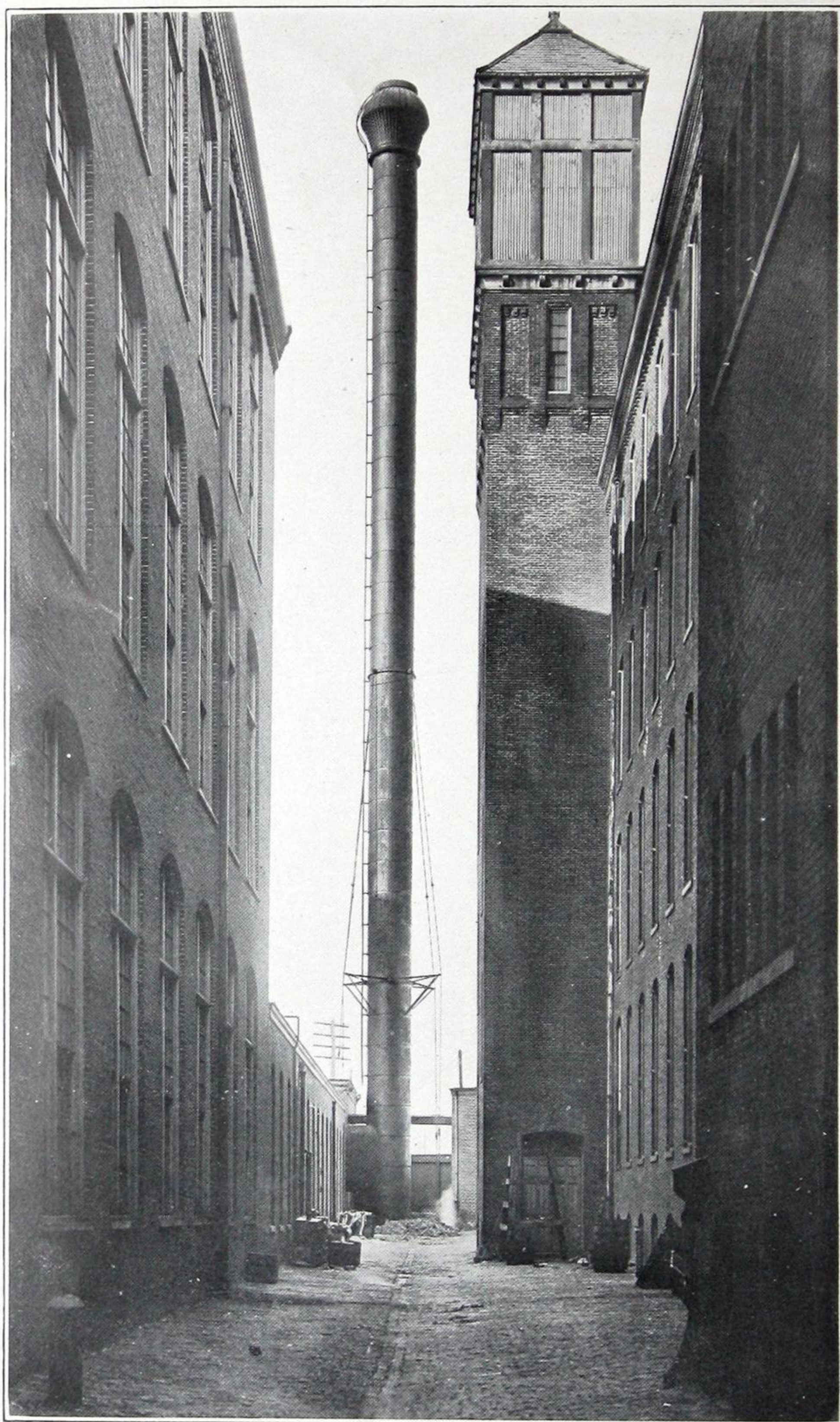
Prof. Peabody states the action of gases in a chimney very clearly as follows:

CHIMNEY DRAUGHT THEORY

“To get an idea of the production of draught by a chimney, we may consider the conditions that would exist if a chimney were filled with hot air and closed at the bottom by a horizontal partition or diaphragm. The pressure of the air at the top of the chimney, due to the atmosphere above that level, is the same on the gases inside the chimney and the air outside. The pressure on the diaphragm at the bottom is the sum of the pressure at the top of the chimney and of the pressure due to the column of hot air in the chimney. At the underside of the diaphragm the pressure will be that at the top of the chimney plus the pressure due to a column of cold air as high as the chimney. This difference of pressure is considered to be the draught, in all theories of the chimney. It may be readily calculated for an assumed set of conditions. For an actual chimney the draught or difference of pressure inside and outside the chimney may be shown by a U tube partially filled with water, and having one end connected to the inside of the chimney and the other open to the air. The water rises in the leg connected with the inside of the chimney; the difference of level measures the draught.”

**WE MANUFACTURE BREECHINGS
and FLUE CONNECTIONS**

We Increase the Height of Stacks



STEEL CHIMNEY GUYED TO ITS OWN FOUNDATION

6 Feet Diameter—150 Feet High

Made and Erected for

JOHN BROMLEY & SONS, Front and Lehigh Ave., PHILADELPHIA, PA.

SIZES OF CHIMNEYS FOR STEAM BOILERS (WM. KENT) *

Diameter, Inches	Area (a) Sq. Ft.	Effective Area $E=A-0.6\sqrt{A}$ Square Ft.	HEIGHT OF CHIMNEY														Equivalent Sq. Chimney Side of Sq. $\sqrt{E+4}$ Inches
			50 ft.	60 ft.	70 ft.	80 ft.	90 ft.	100 ft.	110 ft.	125 ft.	150 ft.	175 ft.	200 ft.	225 ft.	250 ft.	300 ft.	
			Commercial Horse-Power of Boiler.														
18	1.77	.97	23	25	27	29	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	16
21	2.41	1.47	35	38	41	44	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	19
24	3.14	2.08	49	54	58	62	66	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	22
27	3.98	2.78	65	72	78	83	88	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	24
30	4.91	3.58	84	92	100	107	113	119	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	27
33	5.94	4.48	. .	115	125	133	141	149	156	. . .	. . .	. . .	. . .	. . .	. . .	. . .	30
36	7.07	5.47	. .	141	152	163	173	182	191	204	. . .	. . .	. . .	. . .	. . .	. . .	32
39	8.30	6.57	. .	. .	183	196	208	219	229	245	. . .	. . .	. . .	. . .	. . .	. . .	35
42	9.62	7.76	. .	. .	216	231	245	258	271	289	316	. . .	. . .	. . .	. . .	. . .	38
48	12.57	10.44	. .	. .	. . .	311	330	348	365	389	426	. . .	. . .	. . .	. . .	. . .	43
54	15.90	13.51	. .	. .	. . .	. . .	427	449	472	503	551	595	. . .	. . .	. . .	. . .	48
60	19.64	16.98	. .	. .	. . .	. . .	536	565	593	632	692	748	. . .	. . .	. . .	. . .	54
66	23.76	20.83	. .	. .	. . .	. . .	. . .	694	728	776	849	918	981	. . .	. . .	. . .	59
72	28.27	25.08	. .	. .	. . .	. . .	. . .	835	876	934	1 023	1 105	1 181	1 253	. . .	. . .	64
78	33.18	29.73	. .	. .	. . .	. . .	. . .	. . .	1 038	1 107	1 212	1 310	1 400	1 485	1 565	. . .	70
84	38.48	34.76	. .	. .	. . .	. . .	. . .	. . .	1 214	1 294	1 418	1 531	1 637	1 736	1 830	2 005	75
90	44.18	40.19	. .	. .	. . .	. . .	. . .	. . .	. . .	1 496	1 639	1 770	1 893	2 008	2 116	2 318	80
96	50.27	46.01	. .	. .	. . .	. . .	. . .	. . .	. . .	1 712	1 876	2 027	2 167	2 298	2 423	2 654	86
102	56.75	52.23	. .	. .	. . .	. . .	. . .	. . .	. . .	1 944	2 130	2 300	2 459	2 609	2 750	3 012	91
108	63.62	58.83	. .	. .	. . .	. . .	. . .	. . .	. . .	2 090	2 399	2 592	2 771	2 939	3 098	3 393	96
114	70.88	65.83	. .	. .	. . .	. . .	. . .	. . .	. . .	. . .	2 685	2 900	3 100	3 288	3 466	3 797	101
120	78.54	73.22	. .	. .	. . .	. . .	. . .	. . .	. . .	. . .	2 986	3 226	3 448	3 657	3 855	4 223	107
132	95.03	89.18	. .	. .	. . .	. . .	. . .	. . .	. . .	. . .	3 637	3 929	4 200	4 455	4 696	5 144	117
144	113.10	106.72	. .	. .	. . .	. . .	. . .	. . .	. . .	. . .	4 352	4 701	5 026	5 331	5 618	6 155	128

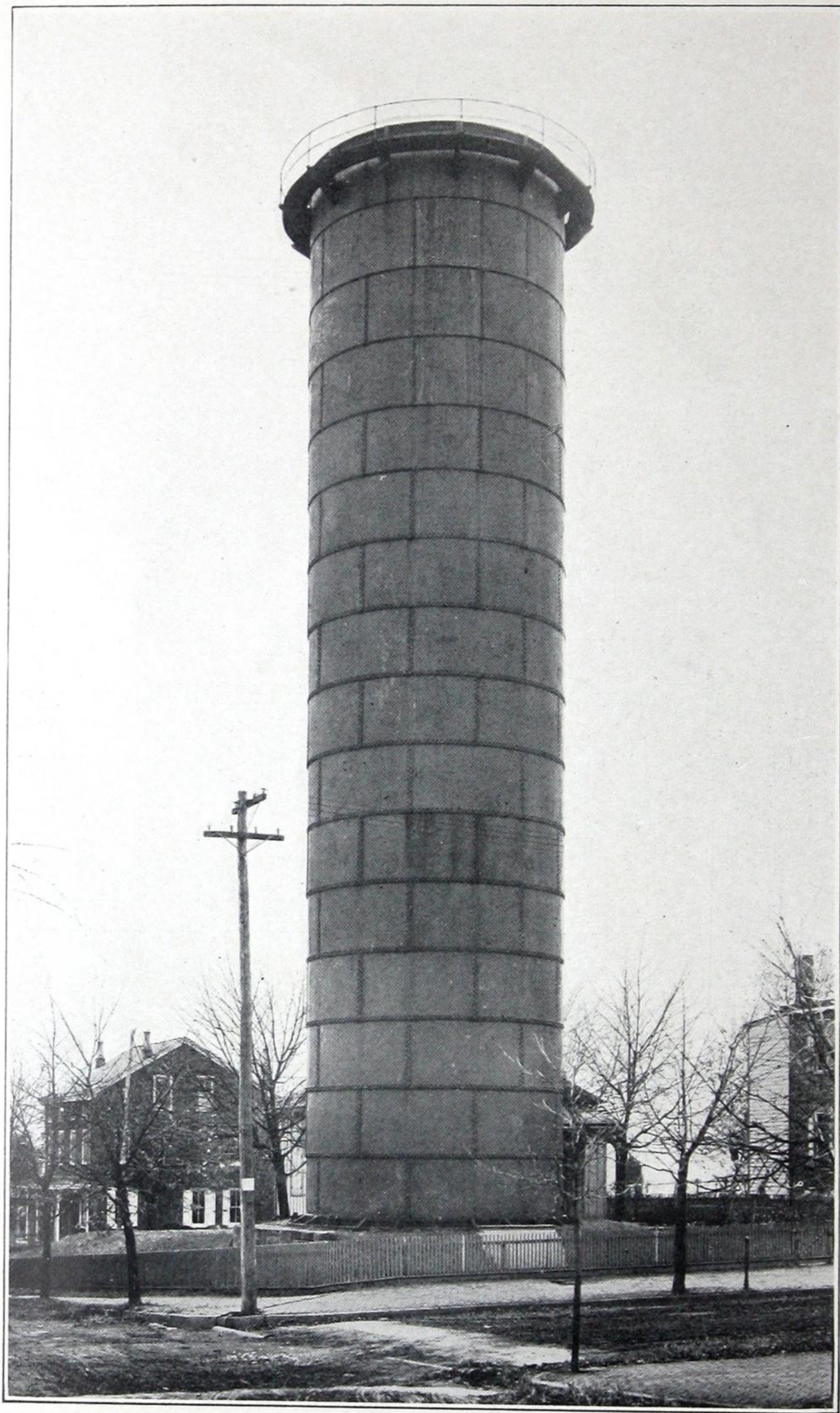
For a rough approximation of the pounds of coal burned per hour for any given size of chimney, multiply the figures in the table by 5.

* Kent's Mechanical Engineers' Pocket Book.

We are fully equipped for promptly producing the largest types and classes of Steel-Plate Construction.

Our long experience insures First-Class Workmanship and Quick Deliveries.

No Location too Distant, or Condition too Difficult for Our Methods.



STEEL STAND - PIPE

20 Feet Diameter, 80 Feet High.

Thickness, $\frac{3}{4}$ Inch to $\frac{5}{16}$ Inch

Made and Erected in 1888 for

THE HOME WATER COMPANY, ROYERSFORD, PA.



Showing Our Method of Erecting Chimneys or Stand-Pipes
STAND-PIPE—18 Feet Diameter, 100 Feet High
Made and Erected By Us for the Town of
MADISON, FLORIDA

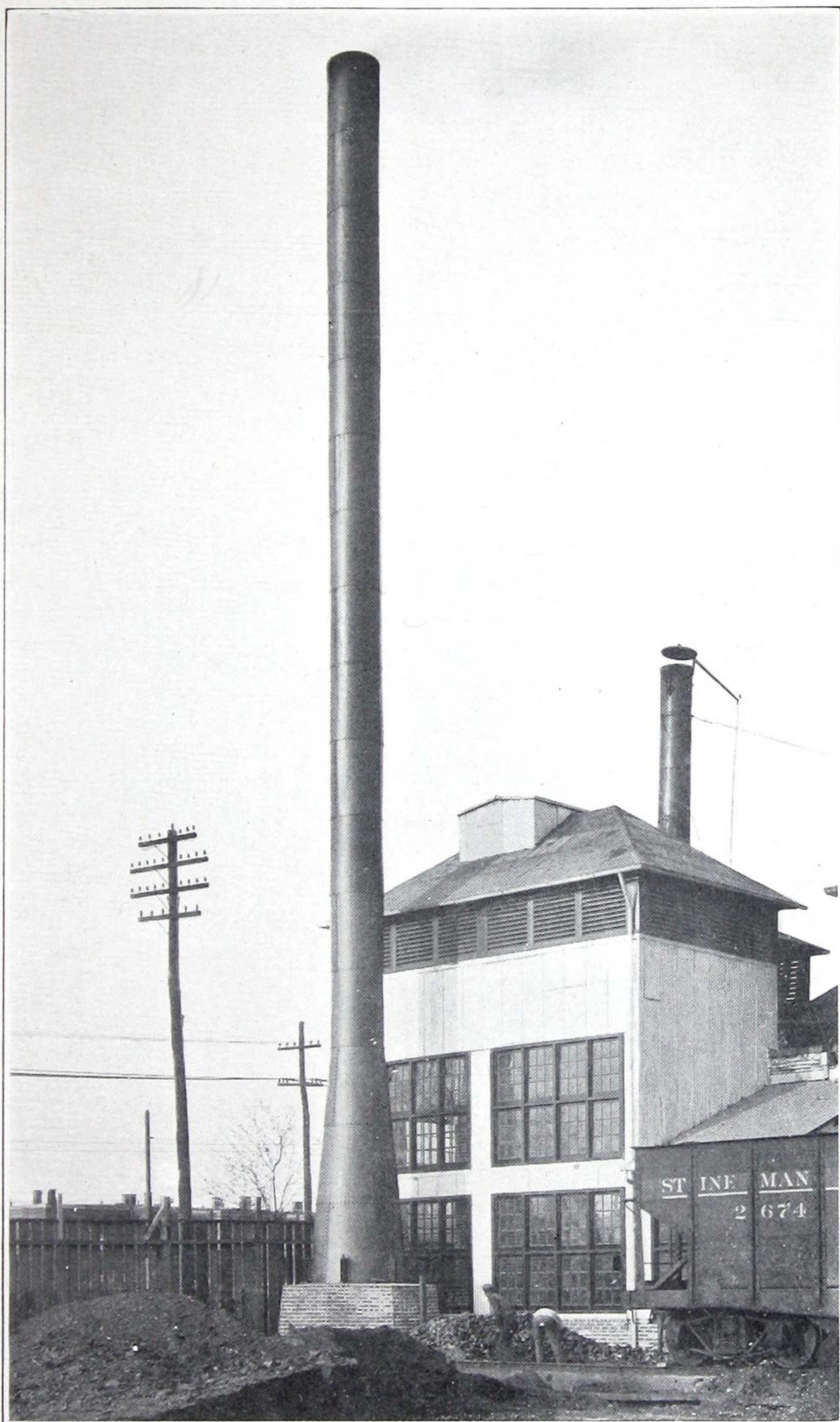
U. S. GALLONS IN STAND-PIPES
FOR ONE FOOT IN DEPTH

Dia. of Tanks.	No. U. S. Gals.	Cubic Ft. and Area in Sq. Ft.	Dia. of Tanks.	No. U. S. Gals.	Cubic Ft. and Area in Sq. Ft.
5 feet	146.88	19.63	18 feet	1903.60	254.47
5 1 inch	151.82	20.29	18 3 inches	1956.80	261.59
5 2	156.83	20.97	18 6	2010.80	268.80
5 3	161.93	21.65	18 9	2065.50	276.12
5 4	167.12	22.34	19	2120.90	283.53
5 5	172.38	23.04	19 3	2177.10	291.04
5 6	177.72	23.76	19 6	2234.	298.65
5 7	183.15	24.48	19 9	2291.70	306.35
5 8	188.66	25.22	20	2350.10	314.16
5 9	194.25	25.97	20 3	2409.20	322.06
5 10	199.92	26.73	20 6	2469.10	330.06
5 11	205.67	27.49	20 9	2529.60	338.16
6	211.51	28.27	21	2591.	346.36
6 3	229.50	30.68	21 3	2653.	354.66
6 6	248.23	33.18	21 6	2715.80	363.05
6 9	267.69	35.78	21 9	2779.30	371.54
7	287.88	38.48	22	2843.60	380.13
7 3	308.81	41.28	22 3	2908.60	388.82
7 6	330.48	44.18	22 6	2974.30	397.61
7 9	352.88	47.17	22 9	3040.80	406.49
8	376.01	50.27	23	3108.	415.48
8 3	399.88	53.46	23 3	3175.90	424.56
8 6	424.48	56.75	23 6	3244.60	433.74
8 9	449.82	60.13	23 9	3314.	443.01
9	475.89	63.62	24	3384.10	452.39
9 3	502.70	67.20	24 3	3455.	461.86
9 6	530.24	70.88	24 6	3526.60	471.44
9 9	558.51	74.66	24 9	3598.90	481.11
10	587.52	78.54	25	3672.	490.87
10 3	617.26	82.52	25 3	3745.80	500.74
10 6	640.74	86.59	25 6	3820.30	510.71
10 9	678.95	90.76	25 9	3895.60	520.77
11	710.90	95.03	26	3971.60	530.93
11 3	743.58	99.40	26 3	4048.40	541.19
11 6	776.99	103.87	26 6	4125.90	551.55
11 9	811.14	108.43	26 9	4204.10	562.
12	846.03	113.10	27	4283.	572.66
12 3	881.65	117.86	27 3	4362.70	583.21
12 6	918.	122.72	27 6	4443.10	593.96
12 9	955.09	127.68	27 9	4524.30	604.81
13	992.91	132.73	28	4606.20	615.75
13 3	1031.50	137.89	28 3	4688.80	626.80
13 6	1070.80	143.14	28 6	4772.10	637.94
13 9	1110.80	148.49	28 9	4856.20	649.18
14	1151.50	153.94	29	4941.	660.52
14 3	1193.	159.48	29 3	5026.60	671.96
14 6	1235.30	165.13	29 6	5112.90	683.49
14 9	1278.20	170.87	29 9	5199.90	695.13
15	1321.90	176.71	30	5287.70	706.86
15 3	1366.40	182.65	30 3	5376.20	718.69
15 6	1411.50	188.69	30 6	5465.40	730.62
15 9	1457.40	194.83	30 9	5555.40	742.64
16	1504.10	201.06	31	5646.10	754.77
16 3	1551.40	207.39	31 3	5737.50	766.99
16 6	1599.50	213.82	31 6	5829.70	779.31
16 9	1648.40	220.35	31 9	5922.60	791.73
17	1697.90	226.98	32	6016.20	804.25
17 3	1748.20	233.71	32 3	6110.60	816.86
17 6	1799.30	240.53	32 6	6205.70	829.58
17 9	1851.10	247.45	32 9	6301.50	842.39

31½ Gallons equals 1 Barrel.

To find the capacity of tanks greater than the largest given in the table, look in the table for a Tank of one-half of the given size and multiply its capacity by 4, or one of one-third its size and multiply its capacity by 9, etc.

STAND-PIPE FOR U. S. GOVERNMENT NAVAL OBSERVATORY AT WASHINGTON, MADE AND ERECTED BY US.



SELF SUPPORTING CHIMNEY—42 Inches Diameter, 80 Feet High
Made and Erected for
J. G. BRILL CAR COMPANY, PHILADELPHIA, PA.

The rate of combustion due to height of chimney is well shown by the following table presented in a paper read before the American Society of Mechanical Engineers by Mr. Wm. Wallace Christie † and is as follows :

COAL CAPACITY
(WM. WALLACE CHRISTIE ‡)

Diameter, Inches	Area (a) Sq. Ft.	HEIGHT OF CHIMNEY														Equivalent Square Chimney Side of Square
		50 ft.	60 ft.	70 ft.	80 ft.	90 ft.	100 ft.	110 ft.	125 ft.	150 ft.	175 ft.	200 ft.	225 ft.	250 ft.	300 ft.	
		Pounds of Coal Burned per Hour = 13XG														
18	1.77	169	182	195	208	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	16
21	2.41	221	247	260	273	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	19
24	3.14	286	312	338	364	390	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	22
27	3.98	364	403	429	455	494	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	24
30	4.91	455	494	533	572	611	637	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	27
33	5.94	. . .	598	650	689	728	767	896	. . .	. . .	. . .	. . .	. . .	. . .	. . .	30
36	7.07	. . .	715	767	819	871	910	932	1 027	. . .	. . .	. . .	. . .	. . .	. . .	32
39	8.30	. . .	. . .	897	962	1 027	1 079	1 131	1 209	. . .	. . .	. . .	. . .	. . .	. . .	35
42	9.62	. . .	. . .	1 053	1 128	1 183	1 248	1 326	1 404	1 560	. . .	. . .	. . .	. . .	. . .	38
48	12.57	. . .	. . .	. . .	1 456	1 547	1 638	1 713	1 833	2 041	. . .	. . .	. . .	. . .	. . .	43
54	15.90	. . .	. . .	. . .	. . .	1 953	2 067	2 171	2 314	2 587	2 730	. . .	. . .	. . .	. . .	48
60	19.64	. . .	. . .	. . .	. . .	2 418	2 548	2 678	2 860	3 198	3 380	. . .	. . .	. . .	. . .	54
66	23.76	. . .	. . .	. . .	. . .	. . .	3 094	3 237	3 458	3 861	4 082	4 368	. . .	. . .	. . .	59
72	28.27	. . .	. . .	. . .	. . .	. . .	3 679	3 848	4 121	4 589	4 859	5 200	5 612	. . .	. . .	64
78	33.18	. . .	. . .	. . .	. . .	. . .	. . .	4 524	4 823	5 395	5 837	6 097	6 474	6 825	. . .	70
84	38.48	. . .	. . .	. . .	. . .	. . .	. . .	5 239	5 603	6 253	6 617	7 072	7 501	7 904	8 658	75
90	44.18	. . .	. . .	. . .	. . .	. . .	. . .	. . .	6 435	7 176	7 592	8 125	8 519	9 074	9 945	80
96	50.27	. . .	. . .	. . .	. . .	. . .	. . .	. . .	7 319	8 164	8 645	9 243	9 802	10 335	11 323	86
102	56.75	. . .	. . .	. . .	. . .	. . .	. . .	. . .	8 268	9 217	9 737	10 426	11 063	11 661	12 779	91
108	63.62	. . .	. . .	. . .	. . .	. . .	. . .	. . .	9 256	10 335	10 933	11 700	12 402	13 078	14 313	96
114	70.88	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	11 518	12 181	13 026	13 819	14 573	15 964	101
120	78.54	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	12 766	13 494	14 443	15 314	16 146	17 680	107
132	95.03	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	15 444	16 328	17 472	18 525	19 526	21 398	117
144	113.10	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	18 382	19 435	20 800	22 061	23 244	25 467	128

The length of flue leading to the stack changes the intensity of the draught. Mr. Thos. Box † gives the following table of the power of a chimney 60 feet high, 2 feet 9 inches square, with flues of different lengths :

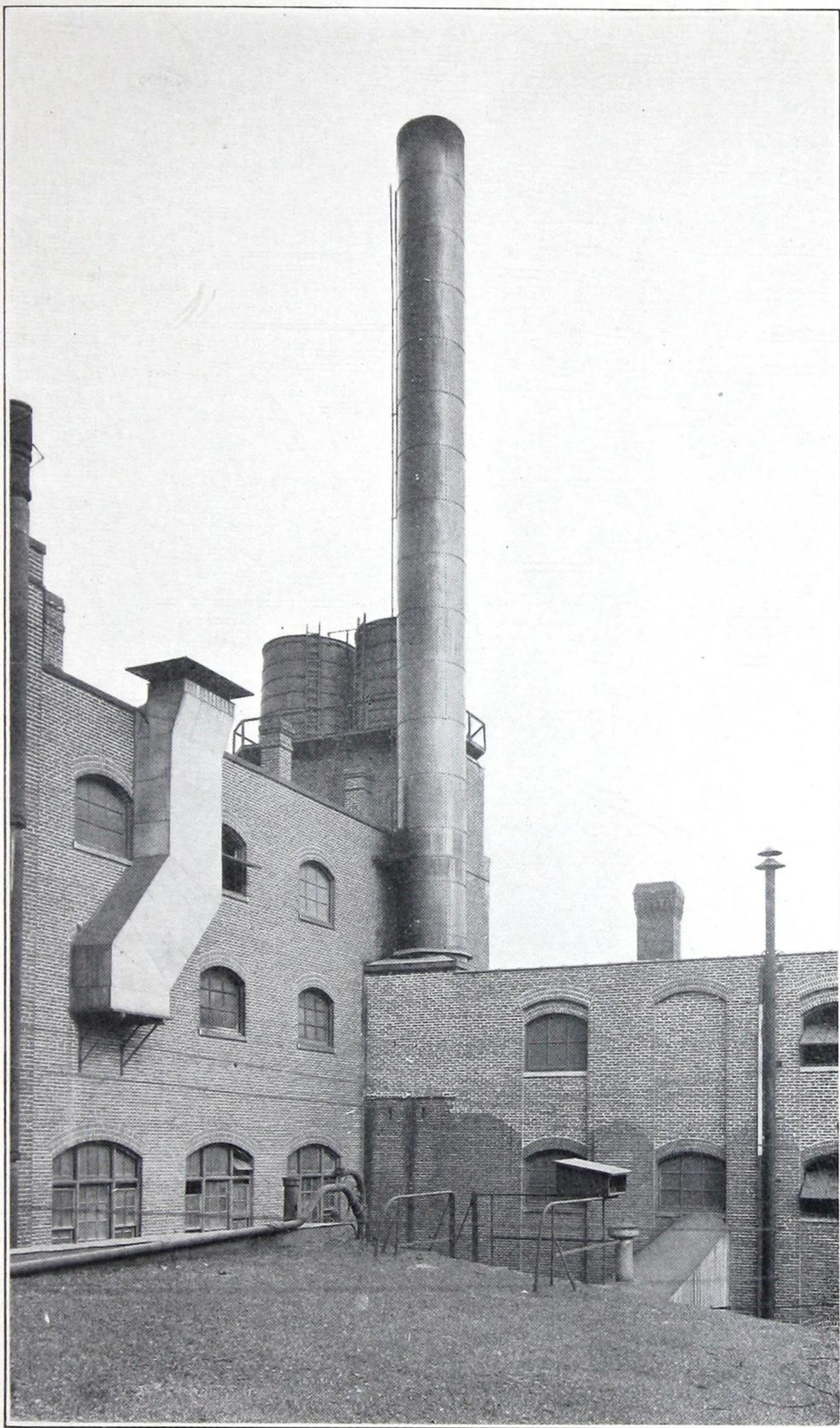
Length of Flue in Feet	H. P.	Length of Flue in Feet	H. P.
50	107.6	800	56.1
100	100	1,000	51.4
200	85.3	1,500	43.3
400	70.8	2,000	38.2
600	62.5	3,000	31.7

† A Practical Treatise on Heat.
‡ Transactions Am. Society Mechanical Engineers, Vol. XVIII

TO THE TRADE

SHIP YOUR STACKS IN SHEETS AND WE WILL ERECT THEM FOR YOU IN ANY PART OF THE UNITED STATES.

CHIMNEYS TAKEN DOWN AND RE-ERECTED



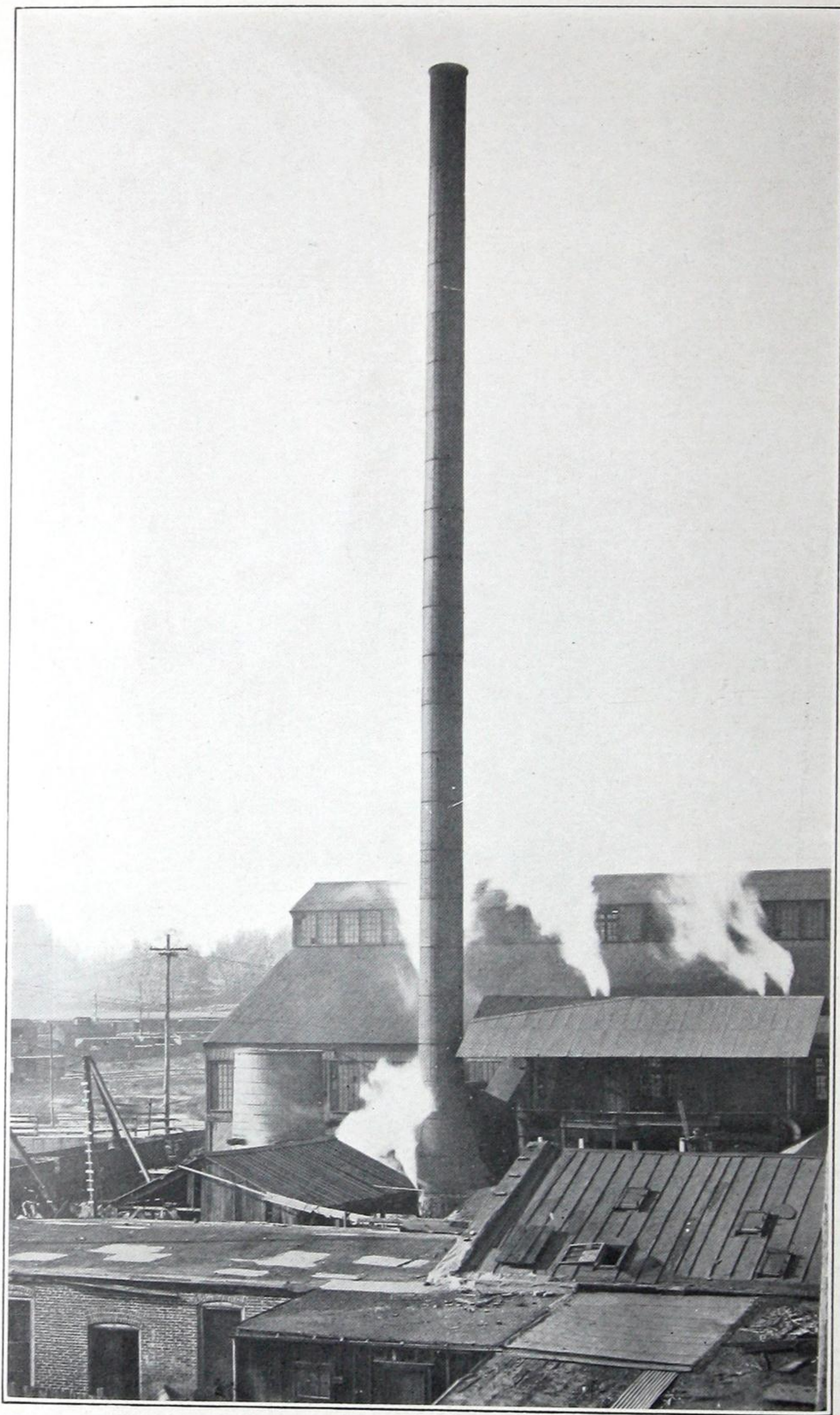
STEEL EXTENSION TO BRICK CHIMNEY

6 Feet Diameter—90 Feet High

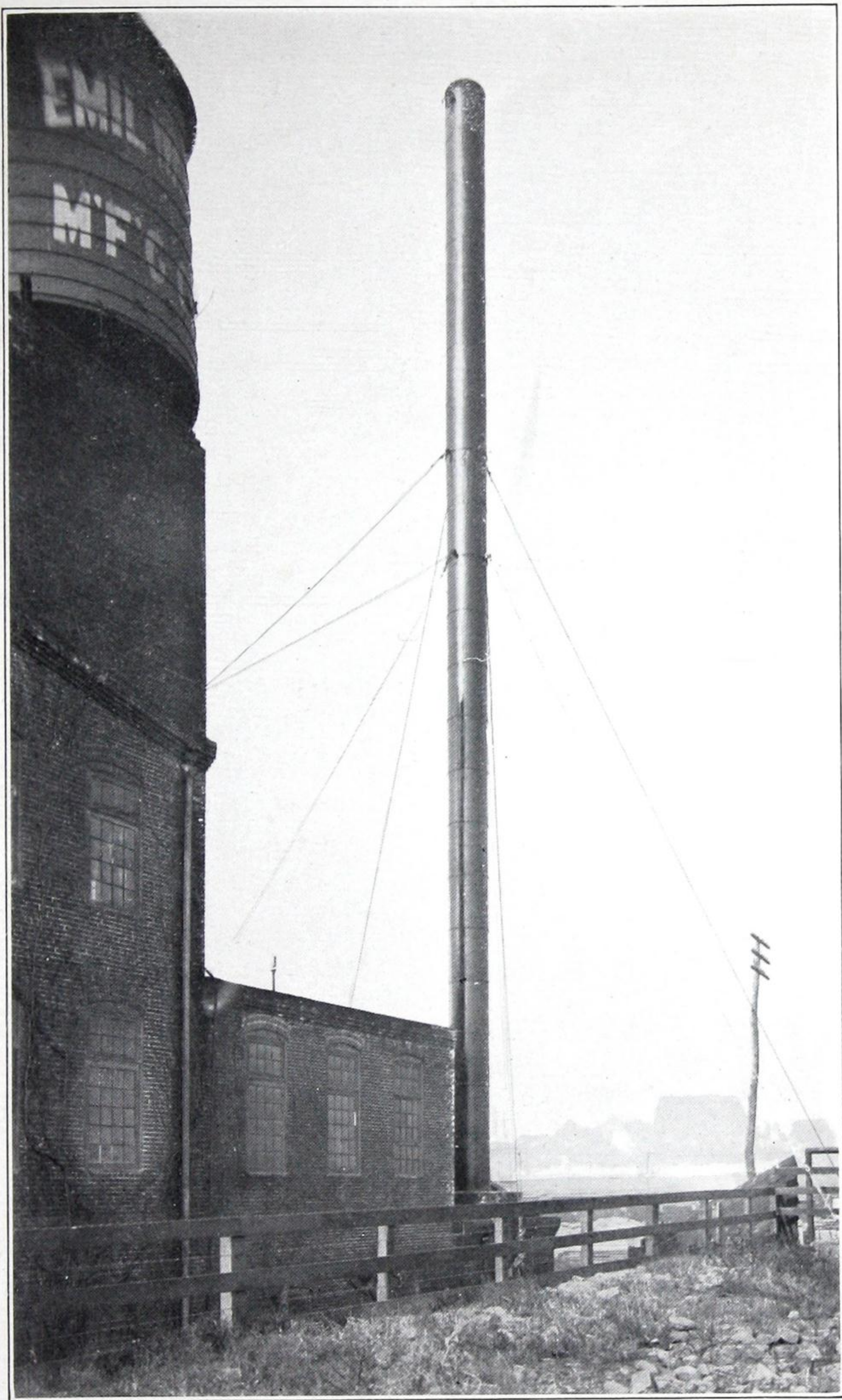
Anchored Without Guys

Made and Erected for

H. O. WILEUR & SONS, Chocolate Manufacturers, PHILADELPHIA, PA.



SELF SUPPORTING STEEL CHIMNEY—7 Feet Diameter, 150 Feet High
Taken Down and Re-erected for
NICETOWN PLATE WASHER WORKS
PHILADELPHIA, PA.



GUYED STACK

This Illustrates a Cheaper Form of Construction than the Self-Supporting Type. It is Often Used and has Proved Fairly Satisfactory.

A FEW FIRMS FOR WHOM WE HAVE ERECTED LARGE STACKS

AMERICAN TYPE FOUNDRY Co.,	PHILADELPHIA, PA.
AMERICAN INCINERATING Co.,	PHILADELPHIA, PA.
AUBURN ELECTRIC LIGHT Co.,	AUBURN, N. Y.
AMERICAN CARBONATING Co.,	NEW YORK, N. Y.
BAKER BUILDING,	PHILADELPHIA, PA.
BALTIMORE & OHIO R. R.,	FAIRMOUNT, W. VA.
JOHN BROMLEY & SONS,	PHILADELPHIA, PA.
CHARLESTON STREET RAILWAY Co.,	CHARLESTON, S. C.
CHAMBERSBURG ENGINEERING Co.,	CHAMBERSBURG, PA.
EDISON ELECTRIC LIGHT Co.,	PHILADELPHIA, PA.
EDISON ELECTRIC LIGHT Co.,	BROOKLYN, N. Y.
EDISON ELECTRIC LIGHT Co.,	ROCKFORD, ILL.
EHRET MAGNESIA Co.,	PORT KENNEDY, PA.
FARMERS FEED Co.,	BROOKLYN, N. Y.
HEIRECK BREWING Co.,	WASHINGTON, D. C.
HOYLE, HARRISON & KAYE,	PHILADELPHIA, PA.
INDIA REFINING Co.,	PHILADELPHIA, PA.
KENILWORTH INN,	BILTMORE, N. C.
ALEX. KERR & BROS Co.,	PHILADELPHIA, PA.
LANG PAPER MILLS,	PHILADELPHIA, PA.
MORTON REED Co.,	BALTIMORE, MD.
MURRAY HILL HOTEL,	NEW YORK, N. Y.
MCCAHAN SUGAR REFINING Co.,	PHILADELPHIA, PA.
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